it would seem, in the substitution of a fresh title-page, with a later date and the name of a different publisher, and the enlargement in the addition of eight reproductions of photographs, some at least of which do not appear for the first time.

Any value the book once possessed has now been greatly diminished by simple lapse of time, and the appearance of this reprint under the false colours of another edition can only be regarded as a breach of faith on the part of those who are responsible for it.

J. W. E.

ELEMENTARY MATHEMATICS.

(1) *The Public School Geometry.* By F. J. W. Whipple. Pp. xii+154. (London: J. M. Dent and Sons, Ltd., 1910.) Price 2*s.* 6*d.* net.

(2) *The Student's Matriculation Geometry.* By S. Gangopádhyáya. Second edition, revised and improved. Pp. xviii+348. (Calcutta: The Students' Library, n.d.) Price 1.4 rupees.

(3) *First Stage Mathematics.* Edited by W. Briggs. Pp. vii+194. (London: W. B. Clive, 1910.) Price 2*s.*

(4) *Second Stage Mathematics (with Modern Geometry).* Edited by W. Briggs. Pp. viii+128+102+186+14 (answers)+21 (exam. papers). (London: W. B. Clive, 1910.) Price 3*s.* 6*d.*

(5) *Conic Sections.* By S. Gangopádhyáya. Pp. viii+97. (Calcutta: The Students' Library, 1909.) Price 8 annas.

(6) *Public School Arithmetic.* By W. M. Baker and A. A. Bourne. Pp. xii+386+2. (London: G. Bell and Sons, Ltd., 1910.) Price, with answers, 4*s.* 6*d.*, without answers, 3*s.* 6*d.*

(7) *A School Algebra.* By H. S. Hall. Part I. Pp. xi+299+xxxvii. (London: Macmillan and Co., Ltd., 1910.) Price 2*s.* 6*d.*

(8) *Elements of Algebra.* By A. Schultze. Pp. xii+309. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1910.) Price 4*s.* 6*d.*

(9) *The Theory of Elementary Trigonometry.* By Prof. D. K. Picken. Pp. vii+48. (Wellington, N.Z., and London: Whitcombe and Tombs, Ltd., 1910.) Price 2*s.* 6*d.* net.

(1) FREE use is made in this volume of inductive methods in establishing the fundamental facts of geometry—the conditions for congruency and parallelism. The opening chapters deal with the measurement of lines and angles and with a few simple constructions. Then follow the elementary properties of the triangle and parallelogram, the usual theorems on inequalities, and a short account of areas. The principles of similar figures are then discussed, and are employed to prove Pythagoras's theorem. And the book closes with the angle and metrical properties of the circle. The author has succeeded in giving in a very concise form a useful summary of the subject-matter of the first six books of Euclid. We regret the introduction of two new terms—new at least so far as elementary text-books are concerned—the use of the word "stretch" for a segment of a straight line, and of the word "cognate" for "corresponding"; while the definition of π on p. 16 is not merely misleading but is incorrect. It is most important that the student should understand that π is a pure number and not an angle. There are a very large number of numerical examples, but most teachers will consider the supply of riders inadequate.

(2) The plan of this book conforms very closely to the syllabus for the matriculation examination at Calcutta, which is practically identical with the Cambridge schedule for the previous examination, the section on proportion being omitted. While due attention is paid to experimental and numerical work, the author has very wisely given chief place to the theoretical developments of the subject. We welcome the presence of a certain number of historical allusions, which might with advantage be increased in a future edition. Those who use this book will find that it answers with uniform success the purpose for which it was written. From its general workmanship it is evident that this volume comes from the hand of an experienced teacher.

(3 and 4) The two parts of this treatise are designed to meet the requirements of the Board of Education examinations in first- and second-stage mathematics. The first part therefore contains the substance of Euclid, book i., and the elementary algebraic processes as far as simultaneous and literal equations. In the second part will be found the substance of Euclid, books ii.–iv., the section on algebra including quadratics, indices, and proportion; the remainder of the volume provides the requisite course of trigonometry up to and including the solution of triangles by logarithms. We have no hesitation in saying that this text-book is admirably suited to the needs of those students who are reading by themselves for this examination, or any other of a similar character. The authors have made good use of their experience in anticipating the nature of the difficulties which the reader is likely to meet with, and in resolving them in a lucid and accurate fashion; and further, what is equally valuable, attention is directed to many points of logical importance which a student is apt to overlook, if working without any supervision. There is a rich supply of well-graded examples and a large number of examination papers, which furnish the student with opportunities for testing his progress.

(5) This book falls into three sections. There is first an introduction containing several preliminary lemmas, together with a few remarks of a general character bearing on geometrical procedure, the second part relates to the parabola, and the concluding chapter to the ellipse. The author has not aimed at giving a complete account of the geometrical properties of conics, but rather a selection of the more useful theorems, his objective being the syllabus for the Calcutta intermediate examination. This leads to some regrettable omissions; there is, for example, no mention of the auxiliary or director circle. Each proposition is followed by a number of simple applications and a few riders of a somewhat harder type are given at the end of each chapter. The book will serve as an admirable introduction to the subject. Among other good features we note the introduction of analysis at several stages, which is calculated to enlarge the outlook of the reader.

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(6) There is little that differentiates this from the other numerous text-books on arithmetic which have appeared during the last few years. The supply of examples for oral and written purposes is plentiful, and a large number of test papers are provided. Although it is probable that those who use this book will find it thoroughly satisfactory, yet we do not consider that it marks any real advance on other recent publications of a similar nature.

(7) The present work is far more than a mere revision of Hall and Knight's "Elementary Algebra." Although some of the features of this book, first published twenty-five years ago, have been retained, yet the organic changes in method of late years demand alterations so considerable that the volume before us is to all intents and purposes a new book. It is marked throughout by the same clearness of style and thoroughness of treatment which characterised the author's earlier work. Graphical methods are employed, but it is satisfactory to note that they have been kept within reasonable limits. The tendency to allow it to expand into an elementary course of analytical geometry is a fatal error, for it overlooks the fact that the student is not sufficiently mature at that stage to be able to appreciate the significance of the theoretical aspect of the subject. We hope that this book will be widely used, for it is both sound and comprehensive. Part i. carries the reader as far as simultaneous quadratics. We understand that part ii. is to be published very shortly.

(8) It has often been pointed out that one significant feature of the influence of examining bodies on the educational curriculum is the tendency to standardise into distinct types, and to collect under separate headings, applications of general principles which the student should be so educated as to work out for himself, when required to do so. The old-fashioned text-books on arithmetic bear emphatic witness to this deplorable result; and it is of some importance to consider whether works on algebra are not similarly affected. This is not the place, however, to develop this theme; but in England it is satisfactory to note that the principles which have actuated those educational bodies which are responsible for the leaving certificate and Army qualifying examinations do much to minimise a very real danger. The author of the present volume attempts to meet the sitaution by focussing attention on the central facts and encouraging the reader to make the requisite applications for himself. By avoiding multiplication of detail, he is able to cover a wider range and prepare the student for more advanced work, in a shorter time than would otherwise be possible, without any sacrifice of principle. The explanatory matter is both full and clear, and there are many useful hints, particularly in connection with the solution of problems. We are, however, inclined to regret that the method of undetermined coefficients is omitted, and that the chapter on the binomial theorem is not prefaced by some quite short account of permutations and combinations, treated numerically. There is at the end of the book a useful collection of more than a thousand examples for revision purposes, which are rather harder than those given in the text. The author has done his work well, and his book deserves a good reception.

(9) There is much that is novel in the plan of this book. Broadly speaking, there are two types of text-books. In one the subject is presented in as simple and elementary a fashion as possible, with no attempt at investigating the fundamental axioms and principles on which the theory is based, and in the other a substantial knowledge of the actual analytical results is assumed and attention is concentrated on the formal concepts. Both of these are beneficial, when properly used. In the study of elliptic functions, for example, it is customary to approach the subject by considering such cases of integration which do not lead to any known elementary function; but when the student has acquired a knowledge of the general results, it is very valuable to start again and take as the base the theory of a doubly-periodic function. Prof. Picken has set himself the task of compiling a book for those who are actually starting trigonometry during their university course. His contention is that such students will have attained a maturity of mind which will be fully capable of appreciating the theoretical principles of this subject, and his object is therefore to supplement the ordinary school treatises which refer almost exclusively to numerical applications. We have little doubt that the class of students the author has in view will materially benefit by his work, which, although brief, is both lucid and scholarly.

OUR BOOK SHELF.

Milch und Molkereiprodukte, ihre Eigenschaften, Zusammensetzung und Gewinnung. By Dr. Paul Sommerfeld. Pp. 140. (Leipzig: Quelle and Meyer, 1910.) Price 1.25 marks.

THIS little book forms one of a series entitled "Wissenschaft und Bildung," the object of which is to present the intelligent reader with brief accounts of particular subjects. It is rather more technical than our own popular books of the same size would be, and naturally it lacks the completeness of a monograph. But it would prove distinctly useful for a large class of readers, including students and lecturers at agricultural colleges, and farmers who take more than a commercial interest in their work. It seems, indeed, to be a very useful method of dealing with a complex subject like agriculture.

The first chapter describes the constituents of milk, giving a clear and concise account of the protein, carbohydrates, fats, and mineral matter present, and then follows a section on the characteristics of milk from various animals. In discussing human milk some interesting statistics are given that show how difficult it is to supply any artificial food to infants that shall take the place of the mother's milk. In Berlin during 1905 the total number of infants dying under twelve months of age was 10,170. The method of feeding 7738 of these was known; 7064 had been fed on cow's milk and only 674 on human milk. The figures for other years are similar.

The chapter devoted to the bacteriology of milk is subdivided into three portions, dealing respectively with fermentation organisms, with organisms producing disease in man, and with organisms producing taints or defects in milk, such as ropiness. As all this is compressed into less than twenty pages the treatment is necessarily very brief.

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